Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A mass spectrometer comprising:

means (1) for generating ions from a sample introduced into a plasma;

a sampling aperture (2) for transmitting some of the ions into an evacuated expansion chamber (3) along a first axis (9) to form an ion beam;

a second aperture (5) for transmitting some of the ion beam into a first evacuated chamber (6);

a first pump (7) for maintaining the first evacuated chamber (6) at high vacuum;

a first ion optical device (17) located in the first evacuated chamber (6) for containing the ion beam wherein the first ion optical device (17) is a mass selective device;

a third aperture (19) for transmitting the ion beam into a second evacuated chamber (20);

a second pump (21) for maintaining the second evacuated chamber (20) at a lower pressure than the first evacuated chamber (6);

a collision cell (24) having an entrance aperture (27) and an exit aperture (28) and pressurized with a target gas (26) , the collision cell (24) being disposed in the second evacuated chamber (20);

a second ion optical device (25) located in the collision cell (24) for containing the ion beam;

a fourth aperture (32) for transmitting the ion beam into a third evacuated chamber (33) containing mass-to-charge ratio analyzing means (37) disposed along a second axis (36), wherein the mass-to-charge analyzing means is configured to mass analyze the ion beam to produce a mass spectrum of the ion beam such that both the first ion optical device (17) and the mass-to-charge ratio analyzing means (37) operate at the same mass to charge ratio, so as substantially to minimize the formation in the collision cell of interfering ions having the said mass to charge ratio;

a third pump (39) for maintaining the third evacuated chamber (33) at lower pressure than

the second evacuated chamber (20).

2. (Original) A mass spectrometer according to claim 1, wherein the first evacuated chamber (6) is maintained at a pressure of approximately 10^{-2} to 10^{-4} mbar.

3. (Previously Presented) A mass spectrometer according to claim 1, wherein the first evacuated chamber (6) is maintained at a pressure of approximately 1-2 x 10^{-3} mbar.

4. (Previously Presented) A mass spectrometer according to claim 1, including a gap of at least 2 cm between the third aperture (19) and the entrance aperture (27) of the collision cell (24).

5. (Previously Presented) A mass spectrometer according to claim 1, wherein the distance between the ion source (1) and the entrance aperture (27) of the collision cell (24) is 90 to 200 mm.

6. (Previously Presented) A mass spectrometer according to claim 1, wherein the mass-to-charge ratio analyzing means (37) includes a main mass filter which preferably is an RF quadrupole.

7. (Cancelled)

8. (Previously Presented) A mass spectrometer according to claim 1, wherein the first ion optical device (17) is an RF quadrupole.

9. (Previously Presented) A mass spectrometer according to claim 1, wherein the second ion optical device (25) is an RF quadrupole.

10. (Previously Presented) A mass spectrometer according to claim 1, wherein the second ion optical device (25) is mass selective.

11. (Previously Presented) A mass spectrometer according to claim 1, wherein the second axis (36) of the mass to charge ratio analyzing means (37) is offset from the first axis (9).

12. (Previously Presented) A mass spectrometer according to claim 1, wherein the first evacuated chamber (6) is divided into a first region (14) adjacent to the expansion chamber containing an extractor lens (8) driven at a negative potential, and a second region (15) adjacent to the collision cell (24) in which the ion optical device (17) is located, by a large diameter aperture (11) and the aperture is sealable by means of a flat plate (12) on an O-ring seal (13).

13. (Currently Amended) A method of operating a mass spectrometer that incorporates a collision cell pressurized with a target gas, the method comprising:

generating~~, from an ion source,~~ an ion beam by introducing a sample into a plasma, the ion beam including analyte ions having an analyte mass to charge ratio and ~~artifact~~ unwanted ions;

mass selecting at least a portion of the ion beam at ~~an~~ the analyte mass to charge ratio;

transmitting at least a portion of the mass selected ion beam into the collision cell, the mass selecting step being effective substantially to minimize the formation in the collision cell of interfering ions having the analyte mass to charge ratio;

receiving at least a portion of the ion beam from the collision cell at a mass analyzer; and

mass analyzing the received ion beam at the same analyte mass to charge ratio as in the mass selecting step.

~~transmitting at least a portion of the ion beam from the collision cell to a mass analyzer; and~~

~~mass analyzing at least a portion of the ion beam in the mass analyzer at the analyte mass to charge ratio.~~

14. (Previously Presented) A method according to claim 13, wherein the mass selecting is achieved by passing the ion beam through a first mass selective ion optical device.

15. (Previously Presented) A method according to claim 14, wherein the first mass selective ion optical device is located in a first evacuated chamber maintained at high vacuum.

16. (Previously Presented) A method according to claim 15, wherein the collision cell is located in a second evacuated chamber operated at lower pressure than the first evacuated chamber, the ion beam being contained in the second evacuated chamber by a second ion optical device.

17. (Previously Presented) A method according to claim 15, wherein the first evacuated chamber is maintained at a pressure of approximately 10^{-2} to 10^{-4} mbar.

18. (Previously Presented) A method according to claim 15, wherein the first evacuated chamber is maintained at a pressure of approximately 1-2 x 10^{-3} mbar.

19. (Previously Presented) A method according to claim 16, further comprising transmitting at least a portion of the ion beam from the ion source through a sampling aperture into an evacuated expansion chamber along a first axis, into the first evacuated chamber through a second aperture;

wherein transmitting at least a portion of the mass selected ion beam into the collision cell includes transmitting at least a portion of the ion beam into the second evacuated chamber through a third aperture, wherein a gap of at least 2 cm is maintained between the third aperture and an entrance aperture of the collision cell.

20. (Currently Amended) A method according to claim 13, wherein a distance of 90 to 200 ~~cm~~ mm is maintained between the ion source and an entrance aperture of the collision cell.

21. (Previously Presented) A method according to claim 19, wherein the mass analyzer is located in a third evacuated chamber operated at lower pressure than the second evacuated chamber, the mass analyzer being disposed along a second axis.

22. (Previously Presented) A method according to claim 14, wherein the first mass selective ion optical device is an RF quadrupole.

23. (Previously Presented) A method according to claim 16, wherein the second ion optical device is an RF quadrupole.

24. (Previously Presented) A method according to claim 16, wherein the second ion optical device is mass selective.

25. (Previously Presented) A method according to claim 15, wherein the first evacuated chamber is divided into a first region adjacent to the expansion chamber containing an extractor lens driven at a negative potential, and a second region adjacent to the collision cell, by a large diameter aperture and the aperture is sealable by means of a flat plate on an O-ring seal.

26. (Previously Presented) A method according to claim 21, wherein the second axis is offset from the first axis.

27. (Currently Amended) A mass spectrometer comprising:

a~~n~~ plasma ion source for generating ~~an~~ ions ~~beam~~ from a sample ~~introduced into a plasma~~;

an ion optical device disposed to receive at least a portion of an ion beam generated by the ion source, the ion optical device being configured to mass select at least a portion of the ion beam generated by the ion source at a mass-to-charge ratio;

a collision cell disposed to receive at least a portion of a mass selected ion beam from the ion optical device, the ion optical device being configured substantially to minimize the formation in the collision cell of interfering ions having the said mass-to-charge ratio; and

a mass analyzer disposed to receive at least a portion of the mass selected ion beam from the collision cell, the mass analyzer being configured to mass analyze the received ion beam at the same mass-to-charge ratio as the ion optical device.

28-61. (Cancelled)

62. (New) A mass spectrometer according to claim 27, wherein the ion optical device and the mass analyzer are configured to scan synchronously.

63. (New) A mass spectrometer according to claim 27, wherein the mass analyzer is configured to mass select the ion beam received from the collision cell at the mass-to-charge ratio.

64. (New) A mass spectrometer according to claim 27, wherein the ion optical device comprises a first RF quadrupole.

65. (New) A mass spectrometer according to claim 64, wherein the mass analyzer comprises a second RF quadrupole.

66. (New) A mass spectrometer according to claim 27, wherein the ion optical device is disposed in a first evacuated chamber, the collision cell is disposed in a second evacuated chamber, and the mass analyzer is disposed in a third evacuated chamber.

67. (New) A mass spectrometer according to claim 27, further comprising a second ion optical device located in the collision cell for containing the ion beam.

68. (New) A method according to claim 13, wherein mass selecting and mass analyzing comprise scanning synchronously.

69. (New) A mass spectrometer according to claim 1, wherein the first ion optical device and the mass-to-charge analyzing means are configured to scan synchronously.